The OAS Newsletter

A supplement to *The Ohio Journal of Science* (June 1991) for the members of the Ohio Academy of Science

Newsletter Returns

by Lee Meserve

Those of you who are "old-timers" with regard to your membership in The Ohio Academy of Science recall that the Academy once published a newsletter which was distributed to members. Regular publication and distribution of the newsletter was discontinued some time back, for a number of reasons including fiscal and time constraints, and has been sorely missed if comments of members are any indicator.

We at *The Ohio Journal of Science* have agreed to incorporate a newsletter as a supplement to the *Journal* for two of the four regular issues annually. The newsletter will be inserted into the center of the June and December issues, can readily be removed if the recipient wishes to do so, and will not be paginated with the journal. We hope that the newsletter will serve the purpose of its predecessor without detracting from the nature of the *Journal*.

We also hope to receive newsworthy material to be incorporated in this newsletter. Deadlines will be constant and are November 1 for the December issue and May 1 for the June issue.

This return issue contains a great deal of information about, and resulting from, the Centennial Meeting of The Ohio Academy of Science. We anticipate the December newsletter to contain some more of the same, but enthusiastically solicit news items from any and all members of the Academy. Additionally, we request feedback regarding the newsletter and suggestions for future items for inclusion. We hope that this format serves the needs of the membership.

Inside . . .

Meetings

September 13-17, 1991
Intecol's IV International Wetlands Conference, Columbus, OH
Contact: Conference Chair
Columbus '92 Wetlands Conference
School of Natural Resources
2021 Coffey Road
The Ohio State University
Columbus, OH 43210

September 22-26, 1991
Aging and Cellular Defense Mechanisms, Modena, Italy
Contact: The Conference Dept.
The NY Academy of Sciences
2 East 63rd Street
New York, NY 10021

Ohio In A Time of Change

by Jeanette Grasselli-Brown

The following is the text of an address by Dr. Jeanette Grasselli-Brown, Honorary National Chairperson of The Ohio Academy of Science Centennial Celebration Commission. Those of us who heard the talk found the words both challenging and inspiring. We publish them here in the hopes that they will provide impetus for continuing efforts by the members of The Ohio Academy of Science.

"I am pleased and honored to be Honorary Chair of the Ohio Academy of Sciences Centennial Celebration Committee. After agreeing, I learned that it meant I also had the honor of addressing Ohio Academy of Science members at the Centennial Awards Dinner.

We are initiating the Centennial Celebration with an in-depth and interesting weekend symposium on Ohio's scientific achievements. We are honoring 25 of Ohio's outstanding scientists and individuals who have worked and thrived in Ohio's economic and intellectual climate of the last half century. That climate was one of economic growth based on industrialization and innovation. Ohio's per capita income was 10% above the national average. Today, our per capita income is 5% below the national average and the number of Ohio college graduates represents only 83% of the national rate.

In June 1989, Governor Celeste

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OAS Constitution Being Updated

Since the last constitutional revision of The Ohio Academy of Science, the membership has changed, both in number and in focus. In an effort to reflect more adequately the goals and mission of the Academy, the Executive Committee has proposed the addition of a number of new Councils and Committees. These additions, which outline the roles and duties of specific councils and committees, appear under Articles V and VI.

Article V additions include:
2. The Senior Academy Council
The Ohio Academy of Science shall maintain a senior academy council as a means of promoting and developing scientific and scholarly activities in Ohio.

A. Organization:

(1) The senior academy council shall consist of a director, associate director and representatives from each section.

(2) The director and associate director are appointed by the executive committee of the Academy upon recommendation of the president. The terms of office shall be four years, subject to annual approval by the executive committee. The first co-directors will be appointed for a two year term.

B. Purpose and Goals:

(1) The primary purposes of the senior academy council are to support and promote the activities of the academy other than those provided by the junior academy.

(2) The senior academy council shall structure programs and other activities which promote science in Ohio.

(3) The senior academy council shall provide visibility, continuity and stability for the sections.

(4) The senior academy council shall assist the sections in expanding and promoting their activities.

(5) Goals shall be established periodically by the senior academy council.

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First Herbert Osborn Award Presented

by Tom S. Cooperrider

Dr. J. Arthur Herrick was awarded the first Herbert Osborn Award by the Ohio Biological Survey this past April 25th. This is a newly established award presented to individuals dedicated to the preservation of natural areas in Ohio.

Dr. Herrick was born and educated in Ohio. He graduated from Twinsburg High School (in Summit County) and then earned his B.S., M.S., and Ph.D. degrees at Ohio State. In 1938, he joined the faculty at Kent State University. There he gained the reputation of being an excellent teacher. In 1969, Dr. Herrick received the "President's Medal" from Kent State, an award for outstanding contribution to the University.

In 1958, Charles A. Dambach, then Director of the Ohio Biology Survey (OBS), appointed a committee of three persons—which gradually evolved into a committee of one, to explore the possibility of assembling a list of Ohio's best natural areas. The idea of such an inventory appealed to Dr. Herrick. He knew that if the state's remaining choice natural areas were to be saved, something had to be done soon, and that the first order of business was a thorough inventory.

Dr. Herrick circulated throughout the state a questionnaire asking individuals to describe the nature and location of their prized biological haunts. He spoke to groups throughout the state describing the mission. He received several hundred responses. He then visited and evaluated the recommended sites.

A mimeographed list of his efforts appeared in 1962, a second

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National Youth Science Camp Delegates Announced

The Ohio Academy of Science announced that Pamela M. Daly of Upper Arlington High School and Daniel Woodard of Kenton High School have been selected as two promising young scientific leaders in Ohio's 1991 high school graduating class. At the invitation of Governor Gaston Caperton of West Virginia, they will participate as delegates in the twenty-eighth session of the National Youth Science Camp held near the National Radio Astronomy Observatory at Green Bank, West Virginia.

Ms. Daly, a senior, has a 3.97 grade point average and has extensive experience in student research including a project funded by a grant from The Ohio Academy of Science, in which she created a granola bar using whey protein.

At State Science Day Ms. Daly received a first place Governor's Award for Excellence in Student Research in Agricultural and Food Science, and a first place in the food science award from Westreco. She presented the results of her research at the Ohio Junior Science

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The OAS Newsletter appears as a supplement to The Ohio Journal of Science biannually (June and December).

Discovery Project Grant Recipient

by Wendy Merchant

Ohio will be the recipient of a multi-million dollar grant from the National Science Foundation (NSF). The grant will provide $10 million of federal funding over a five-year period to support the Ohio Mathematics/Science Discovery Project. The Discovery Project is a statewide plan to revolutionize the way mathematics and science are taught in Ohio's classrooms —from kindergarten to graduate school.

The primary goal of the Discovery Project is to produce scientifically and mathematically literate students, many of whom will elect careers in science or mathematics. A major element of the Discovery Project is the involvement of "bench scientists" and mathematicians in the educational process in a profoundly different way. As a result of this involvement a new profession would evolve—scientist/educator. The members of this new profession will work as peers with elementary, middle and high school teachers. Everyone, whether Nobel laureate or kindergarten teacher, would have a direct stake in the success of science and mathematics education.

The basic design of the Discovery Project was developed by Dr. Kenneth G. Wilson, Nobel laureate and Hazel C. Youngberg , Trustees Distinguished Professor of Physics at the Ohio State University, and Dr. Jane Butler-Kahle, Condit Professor of Science Education at Miami University. Professors Wilson and Kahle will serve as co-principal investigators for the Discovery Project.

Forty-seven states participated in the first round of the grant competition. Thirty continued into the second round. The final stage of review included site visits from NSF, and Ohio was one of 13 states selected for a site visit. Ohio's site visit was held at the offices of the Ohio Board of Regents in early March. Based on the outcome of the site visits, the NSF funded ten proposals. Of the winning states, Louisiana and Ohio received the largest grants.

The Ohio Mathematics/Science Discovery Project was developed through the cooperative efforts of the Ohio Board of Regents and the Ohio Department of Education working with universities, colleges, schools, and community organizations from across the state. The grant requires matching state funds, which are in the process of being appropriated.

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Academy Awards for Science and Mathematics Education

The Ohio Academy of Science selected 22 teachers and schools to receive Acker and Krecker awards for excellence in science and mathematics education for the 1990-91 school year.

The Acker and Krecker award winners are eligible to compete for a total of $12,500 in Battelle Awards for Professional Development which were announced at this past State Science Day. The Battelle Awards program is a joint effort of The Ohio Academy of Science and Battelle Memorial Institute to recognize excellence in science and mathematics education and to promote professional development of science and mathematics teachers in grades 7-12 in Ohio schools.

Annual Battelle Awards for Professional Development will be made of $3,000 each for a science teacher and a mathematics teacher and $3,250 for a science department and a mathematics department in grades 7-12 in Ohio public and non-public schools.

Annual Battelle Awards for Professional Development of $3,000 are given to a science teacher (grades 7-12) and to a mathematics teacher (grades 7-12) who submit the most outstanding written proposals to the Academy as to how this support will enhance their professional development and consequently improve teaching. The winners will report on their work at the 1992 annual meeting of the Ohio Academy of Science.

A $3,250 annual Battelle Award for Professional Development is given to a school science department and to a school mathematics department (grades 7-12) which submit the most outstanding written proposals to the Academy as to how these funds will enhance the faculty's professional development and consequently improve teaching. The winning departments will report on their work at the 1992 annual meeting of the Ohio Academy of Science also.

Acker Teacher Awards were given to: Judy Turner, Marlington High School; Robert Ragley, Beachwood High School; Martha Martino, Colerain High School; Teresa Ayotte, Battelle Youth Science Program; Teresa Bettac, Willis Intermediate School; James Short, Gorham Fayette

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Physics and Mathematics Classics Republished

by E.D. Rudolph

Dover Publications, 31 East 2nd Street, Mineola, NY 11501, is well known to readers of the *Ohio Journal of Science* for its high quality, reasonably priced paperback reprints of important out-of-print scientific books.

Some recent releases may be of interest: *What is Mathematical Logic?* by J.N. Crossley, C.J. Ash, C.J. Brickhill, J.C. Stillwell, and N.H. Williams (reprint of a 1972 Oxford University Press edition), 82 pages, $4.95; *Treatise on Thermodynamics* by Max Planck (reprint of Alexander Ogg's authorized translation from the 7th German edition, the 3rd English edition by Longmans, Green, and Co., 1926), 297 pages, $7.95; *Equations of Mathematical Physics* by A.N. Tikhonov and A.A. Samarskii (reprint of the English translation of the 1953 Russian edition by A.R.M. Robson and P. Basu, edited by D.M.Brink, as 1963 volume 39 in Pergamon Press' International Series of Monographs on Pure and Applied Mathematics), 765 pages, $16.95; *X-Ray Diffraction* by B.E. Warren (a corrected republication of a 1969 edition issued by Addison-Wesley Publishing Co.), 381 pages, $9.95; and *The Conceptual Foundation of the Statistical Approaches in Mechanics* by Paul and Tatiana Ehrenfest (reprint of the English translation by Michael J. Morovcsik from the German 1912 edition originally published by Cornell University Press in 1959), 114 pages, $4.95.

Science Teachers Selected For APS Summer Research Program

Twelve high school science teachers have been selected for a national 10-week summer research program sponsored by the American Physiological Society.

The society started the program this year as a means to provide high school science teachers with experiences in modern physiology research. The teachers' experiences will be shared with students with the hope that students will take an interest in pursuing a career in the biological sciences.

The 12 teachers, selected in a national competition, were awarded grants that included $5,000 plus $750 to support the teacher's attendance at the April 1991 FASEB meeting in Atlanta, where they will be honored at a luncheon.

Listed below are the Ohio teachers and their high schools, followed by the host institutions and the mentors: Belinda B. Banks, Fairborn High School, Wayne State University School of Medicine, Robert W. Putnam; George H. Gould, Firestone High School, University of Akron, Daniel Ely; Lana Hays, Simon Kenton High School, University of Cincinnati School of Medicine, Nicholas Sperelakis.

Academy Awards

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High School; Paul Lenz, Miller City High School; Tina Albrecht, Frontier High School; Joyce Thornberry, Piqua Catholic High School; Jerry Thoreen, Newton Local School; Sherylene Rice, Clay High School; Charles Sweeney, St. John's High School.

The following schools are recipients of the Krecker School Award:
Josephine Cutright, Zane Trace High School; Teresa Ayotte, Battelle Youth Science Program; Donald Russell, Dublin High School; James Short, Gorham Fayette High School; Ric Allwood, Clay High School; Pamela Wendel, Lehman High School; Mary Leistner, Sidney High School.

Battelle Awards were presented to: Teresa Bettac, Willis Intermediate School; Paul Lenz, Miller City High School; Sue Boon (school award), Louisville Jr. High School; Paul Lenz (school award), Miller City High School.

Congratulations to all award recipients.

Constitution Update

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C. The director of the senior academy council shall be a member of the executive committee and the academy council.

3. The Industrial Council

A. Membership: The industrial council shall consist of members and non-members of the academy who are committed to the promotion and advancement of science and technology in Ohio. Members of the council are appointed by the president.

B. Chairpersons: The industrial council chairperson is appointed by the president for a two year term.

C. Purposes:

(1) To facilitate linkages among government/industry/education and the academy.

(2) To facilitate continuing science and technology education.

(3) To address the needs of industrial scientists.

D. Goals: Specific goals of the industrial council shall be established periodically by the industrial council.

4. The Council of Past Presidents

A. Membership: The council of past presidents shall consist of all past presidents of the Academy.

B. Chairperson: The immediate past

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Plant Sciences Awards

Amy J. Scherzer was awarded the 1991 Ohio Academy of Science Plant Sciences Section Outstanding Graduate Student Paper Award. This was awarded for her paper entitled "Ozone and nitrate deposition effects on the physiology of *Acer saccharum*" which was co-authored by Keith Jensen and Ralph Boerner.

Amy Manning received an Honorable Mention for her paper entitled "The effects of rooting on floral timing in sunflower in a sterile culture system."

OAS MEMBERSHIP

The Ohio Academy of Science membership increased in 1991 by 200 individuals.

We're pleased with these numbers, however, we want to continue to increase our membership in the coming year. If you know anyone who is not currently a member, tell them about OAS! Professionals and students are encouraged to join. We have much to offer each other.

We'd also like to take this opportunity to welcome our new members.

First Herbert Osborn Award Presented

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in 1965, and in 1974 an OBS publication, entitled "The Natural Areas Project: A Summary of Data to Date," but more familiarly known, like its mimeographed predecessors, simply as "Herrick's List."

Dr. Herrick took a leading role, also, in effecting the preservation of many of these natural areas. Ohio has two strong organizations devoted to natural areas preservation. One, The Nature Conservancy (TNC), is a private association dedicated to that task. Dr. Herrick has long been a leader in TNC, receiving in 1969 the Ohio Chapter's "Silver Bowl Award." One of the Conservancy's preserves, the "Herrick Fen," is named in his honor.

In 1970, with the passage of the Ohio Natural Areas Bill, the state implemented a complementary public effort, that now works under the direction of the Ohio Department of Natural Resources' (ODNR's) Division of Natural Areas and Preserves, and overseen by the Natural Areas Council. In 1972, Dr. Herrick was appointed by the Governor of Ohio to a four year term on the Natural Areas Council. Upon completion of his term, he continued as an active participant in that body, and remains so to this day. He was inducted into the ODNR's "Conservation Hall of Fame" in 1972.

Ohio citizens are indebted to the legacy of this premier biologist.

Herrick's "List" and Herrick's guidance have been invaluable to both the private and the public work of natural areas preservation in the state. Today's Ohio citizens are indebted, and to an even greater extent those citizens of the future will be indebted, to the legacy of this premier Ohio biologist.

Constitution Update

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president shall be the chairperson of this council.

C. Purpose: To meet at the call of the President for the purpose of providing guidance.

The following additions appear within article VI:

8. Personnel Committee

A. Membership: The personnel committee shall consist of five members appointed for two year terms by the President.

B. Chairperson: The immediate past president shall serve as chairperson.

C. Responsibilities:

(1) All personnel matters, including establishment of policy, should be referred to this committee for recommendation to the executive committee.

(2) The personnel committee conducts an annual performance and salary review of the executive officer of the Academy prior to the October executive meeting, at which meeting it makes a report with recommendations.

9. Finance Committee

A. Membership: The finance committee shall consist of the treasurer, the president, the president-elect and the executive officer (ex-officio, non-voting) and one member-at-large appointed for a one year term by the president.

B. Chairperson: The treasurer shall act as chairperson.

C. Responsibilities:

(1) Supervise the management of the investment portfolio of the Academy.

(2) Assist the treasurer by providing advice and counsel on financial matters.

(3) Review the annual auditor's report.

(4) Provide consultation to the treasurer and the executive officer in preparation of the annual budget.

(5) Recommend changes in the structure of the Academy dues and fees.

10. Marketing Committee

A. Membership: The committee shall consist of three individuals appointed by the president. Each year the president shall appoint one person to a three year term on this committee. Initially, the president shall appoint three members, one to a three year term, one to a two year term, and one to a one year term. A member of the executive committee shall be appointed annually by the president. The executive officer shall be an ex-officio member of the committee.

B. Chairperson: Each member shall serve as chairperson in the third year of that person's term of appointment on the committee.

C. Responsibilities:

(1) To promote recruitment and retention of members, sales and distribution of publications.

(2) To pursue paid advertising and promote the circulation of the *Journal*.

(3) To promote meetings, symposia and conferences.

(4) By October, to present a report to the executive committee.

(5) Other responsibilities as assigned by the executive committee.

These additions will be distributed for consideration and approval of the membership in the future.

Ohio In A Time of Change

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gathered a blue ribbon commission to review Ohio's economic challenge of its 3rd century through Science and Technology. Its report—published a year later—was received enthusiastically. It recommended a blueprint for action that paralleled closely many of the conclusions from the 1989 MIT report, "Made in America: Regaining the Productive Edge." The reports emphasize change, especially technological, human resource and demographic changes which are occurring today. An underlying theme—applicable in Ohio as well as nationwide, "Americans must produce well if Americans are to live well"—and it is creativity and innovation that equals productivity. U.S. industry is threatened and its recovery will be affected by its ability to adapt to change. U.S. workers must also understand that the world they live in has changed. The need for a sound education, for training and retraining, has never been more critical.

We read daily in our newspapers that U.S. industry is being challenged in a new, global economy. The recent political and social changes (or lack of change) in Eastern Europe, the Soviet Union, the Gulf area and the Far East are dramatic proof of an increasingly interdependent world where human resources and technological advantages will influence growth and the overall standard of living.

If the U.S. is to compete successfully, we must be both numerate and literate, i.e. we must blend sciences and the humanities in the context of the 21st Century put forth by C.P. Snow. Our decisions, political, social and economic, must be made with consideration of the historical and environmental, political and social consequences of the actions we take.

Carl Sagan recently wrote, "We have a society dependent on science and technology, in which the average person understands hardly anything about science and technology. This is the clearest imaginable prescription for disaster —especially in a purported democracy,—a dangerous situation when decisions must be made about the environment, health care, defense and the many other urgent problems the nation and the planet face."

Over the last 40 years, technology has drastically altered the fabric of society. To illustrate how technology has defined our past and present circumstances, to show how much our world has been turned upside down and inside out, let me give you a historical scenario.

It is 1952. The transistor is five years old. In four years, three Bell Labs scientists will win the Nobel Prize for this creation, but in 1952, the transistor has not yet moved from the lab to the market. Its potential has yet to be realized.

This is the scene: Western Electric is holding a symposium on how to build the transistor. Open to everyone, it attracts representatives from 34 companies.

Bell System managers explain the manufacturing process. The managers of one company in particular are taking copious notes. For $25,000, this company has purchased the rights to the transistor. It now wants to know how to build it.

The symposium ends and the managers tuck their notes into their briefcases. They leave, satisfied that they have the information they need.

Two years later, Japan is suddenly selling transistors and Sony, the little company that came to the symposium and invested only $25,000 in the technology, is about to make a fortune.

Needless to say, some profound changes have taken us from the self-confident 1950s—when

Centennial Honorees

Dr. Glenn H. Brown—Professor Emeritus, Kent State University
Dr. Lois A. Cook—Professor Emerita Chemistry, Wright State University
Dr. Ralph W. Dexter—Emeritus Professor of Biological Sciences, Kent State University
Dr. Herman J. Eichel—President, Chartwell Technologies
Mr. Richard B. Engdahl—Research Consultant, Battelle Memorial Institute
Dr. James B. Farison—Professor of Engineering, University of Toledo
Dr. Jane L. Forsyth—Professor of Geology, Bowling Green State University
Dr. James M. Freed—Professor of Zoology, Ohio Wesleyan University
Mr. Sherman L. Frost—Adjunct Professor, Ohio State University School of Natural Resources
Dr. Richard P. Goldthwait—Professor Emeritus of Geology, Ohio State University
Dr. Charles E. Herdendorf—Science Coordinator, Columbus-America Discovery Group
Mr. Marion A. Keyes—Chairman, DCOM Corporation
Dr. Charles C. King—Executive Director, Ohio Biological Survey
Dr. Milton A. Lessler—Professor Emeritus, Ohio State University
Dr. Allen G. Noble—Professor & Head Department of Geography, University of Akron
Dr. John H. Olive—Professor of Biological Sciences, University of Akron
Ms. Martha Potter Otto—Curator of Archaeology, Ohio Historical Society
Mr. Spencer E. Reames—Science Teacher, Benjamin Logan High School
Dr. George Rieveschl, Jr.—Retired Vice President for Research and Development, University of Cincinnati
Dr. Roy W. Rings—Professor Emeritus, Ohio Agricultural Research and Development Center
Dr. Ronald L. Stuckey—Professor of Plant Biology, Ohio State University
Dr. Thomas E. Wagner—Scientific Director, Edison Animal Biotechnology Center
Mr. Ronald M. Watterson—Librarian Emeritus, Medical College of Ohio Library
Mr. David M. Weaner—Physics Teacher, Westerville North High School
Dr. Clara G. Weishaupt—Associate Professor Emerita, Ohio State University

technology was ours to offer to the world—to the urgent 1980s, when the U.S. finds itself struggling to retain a competitive position in the high-tech race.

To what can be attributed these circumstances? To technology itself, for one thing. Technology has altered the fundamental nature of competition. Domestic markets have all but disappeared as economic borders between countries evaporate.

The MIT commission on industrial productivity has taken a look at the decline of many American industries. Not surprisingly, the commission points to outdated manufacturing and business strategies and companies focus on the short-term view. In many firms, quality has taken a back seat to a short-cut approach in producing goods and services. And industry's human resources were virtually ignored.

But we are, as a nation, testing time-honored concepts and looking to transform our thinking, while preserving fundamental American strengths. We are engaged in a sweeping process of change that will challenge our vision, our energy, and our capacity for wisdom and knowledge. America is in the remaking!!!

As industry is truly "globalized," we will see some interesting anomalies. For example, although only one remaining domestic company produces color TV sets, it turns out that that domestic company has its main production facility in Mexico. Most color TV sets sold in the U.S. are made in the U.S.—in the domestic plants of foreign owners (e.g. the California plant of Sony). Should U.S. policy be aimed at helping domestic companies or domestic plants?

In the debate over consumer electronics, it is troubling that we are looking backwards. We are driven by desire to recapture old glories. Too often, we are governed by our vision of what the world has been like in the past or what we wish it would be like, not by what it is really like today or what it will become tomorrow.

In some ways we behave like that Admiral on the bridge of a battleship who sees a blip dead ahead on his radar screen, and quickly orders a message sent to the blip saying, "Steer to port." The answer comes back just as quickly, saying, "*You* steer to starboard!" The Admiral, angry, shouts back, "I said steer to port. I am an Admiral and this is a battleship." The answer comes back, "Steer to starboard. I am a seaman 2nd class and this is a lighthouse!"

I would argue that we ought to first pay attention to present and future strengths. At this moment in time, the competitive strength of our biotechnology industry ought to be more concern than our competitive position in consumer electronics.

Our competitive strength in a global economy will certainly depend on our human resources. And here the future poses challenges of immense proportions.

As we consider this crisis of competitiveness with foreign nations, it is imperative that the U.S. build even further on what has been our greatest strength for 50 years—the strongest scientific research capability in the world.

Yet even this advantage is under attack. Although we have the largest R&D budget in the world, others spend a higher percentage of their GNP on R&D. The NAS points out that 50% of the patent applications in the U.S. are now made by Japanese. While our nation maintains a positive trade balance in many areas of advanced technology, such as aircraft, scientific instruments and pharmaceuticals, we have fallen far behind in more traditional sectors, such as automobiles, textiles and steel. Increasingly, we will need to maintain and build our base of science and technology. This will not be easy! By the year 2010, it is projected that the U.S. will have a shortage of over a half million scientists and engineers. I will come back to this because potential applicants for these jobs are in K-12 now.

Similar projections indicate that the overall mix of jobs in the future will be very different from those currently available. Between 1984 and the year 2000, the Hudson Institute projects that 25 million new jobs will have been created in the U.S. Four out of every ten jobs will be in fields such as engineering, physics, chemistry, or health, computer and engineering technology. Workers will be required to use more math, reading and writing skills than today, and work will be done primarily in teams —making problem solving and communication skills a prerequisite.

Let me put the situation in perspective with a quote from the September 19, 1988 *Business Week*. "Take a trip back to what may be our future. It is the 1851 industrial exhibition at the Crystal Palace in London. Britain is the dominant world power. The U.S. is No. 2 in industry and catching up fast.

Made-in-America reapers, muskets and tools are the marvels of the show. Worried delegations of British industrialists set sail (to America) to investigate. Their findings? American manufacturing prowess is in large part due to a highly educated work force. The Yankees have an astonishing high literacy rate of 90% among the free population. In the industrial heartland of New England, 95% of adults read and write. In contrast, just two-thirds of the people in

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Ohio Changes

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Britain are literate.

Now zip ahead a century or so to the 1980s. The U.S. is the dominant world power, and it is Japan that is No. 2 and closing fast. CEOs marvel at the quality of Japanese products flooding their markets. They make pilgrimages to Tokyo. Their findings? Manufacturing superiority is being forfeited to the Japanese. And yet, once again, behind the success in manufacturing process lies a better-educated work force. In 1988, Japan's functional literacy rate is better than 95%. In America it's down to about 80%."

So our challenge is to improve the quality of the work force for the future, to pursue the research activities that will give our industry a competitive edge, and to train a new generation of scientists and engineers.

Our competitive strength in a global economy will certainly depend on our human resources. Here the future poses challenges of immense proportions because today the U.S. educational system is failing to produce the number and quality of people educated in science and technology that our society and our economy needs. The problem has its origin in demographics and in the shifting interests of students.

Demographics show us that until the late 1990s, the population of 18-24 year olds will decline to levels 30-40% below the level of the early 1980s. Even more importantly, there will be a significant change in the make-up of the 18-24 year old group. By the early 2000s (only 9 years away!), two-thirds of this cohort of potential students will be women, Blacks and Hispanics. These are exactly the groups who have traditionally shunned careers in science and technology. It is very clear that the issue of U.S. competitiveness and our resulting high standard of living is intricately tied to our ability to attract these three groups into our universities and into careers in science and technology.

So change is inevitable, but in the areas of technology and human resources we must turn the change to our advantage—as a nation and as a state. We know that predicting the discoveries of science and the inventions of technology is a hazardous occupation. Will Rogers warned against it, "I never predict the future. If you're right, no one remembers; if you're wrong, no one forgets."

In its powerful and inciteful report, the Ohio Science and Technology Commission set forth the Goals for Ohio, and an action plan that addressed the very issues of technology and demographic changes that I have just reviewed.

> ***Our challenge is to improve the quality of the work force....***

These included: (1) a coherent and coordinated science policy to guide decision making into Ohio's 3rd century; (2) universities and colleges—supported and funded so that Ohio's science, education and research needs will be met into the 21st century; (3) an education system for K-12 and beyond that produces scientists, engineers, technicians and workers able to contribute effectively to an advanced economy (this will include increased emphasis on science and math, keeping potential S&T majors in the pipeline); and (4) industry that uses technology to compete successfully.

Implementing these four goals will not be easy, especially in a time of budget crisis in the state. Yet we must support the changes and accept the challenges if Ohio is to move ahead and successfully grow in its 3rd century. Marie Curie once said, "Nothing in life is to be feared; it is only to be understood."

We do understand our mission and we must unite in a steadfast pursuit of our industrial and educational goals. If we are successful, the next generation of Americans will live in a nation moving into the 21st century with the same dynamic strength and skills that made it a world leader a generation ago."

Science Camp Delegates

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and Humanities Symposium and at the Centennial Annual Meeting of The Ohio Academy of Science.

Mr. Woodard, also a senior, has a 3.58 grade point average and has extensive experience in student research on the effects of decreased watering on plant growth, production and nutrition.

Within the past year Mr. Woodard has twice represented the Academy at meetings in Washington D.C. In May 1990 he attended the Youth Environmental Action Forum and in February 1990 he attended the American Junior Academy of Science meeting. At State Science Day he received three Governor's Awards for Excellence in Student Research—two for Agriculture and Food Science and one for Water Resources Research. He also received a first place award from the U.S. Navy, from the Ohio Federation of Soil and Water Conservation Districts and from the Water Management Association of Ohio.

Established in 1963 as a part of West Virginia's Centennial Celebration, the Science Camp annually provides for 102 student delegates—two from each state and the District of Columbia—a four week summer forum where delegates exchange ideas with leading members of the academic and corporate worlds.

Congratulations to these two outstanding students.